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STRUCTURE AND SIGNAL CHARACTERISTICS OF SYSTEM NO. 2 COMMUNICATION-NAVIGATION EQUIPMENT

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SYSTEM NO. 2 COMMUNICATION-NAVIGATION EQUIPMENT

Purpose and Range

System No. 2 provides a long-range aircraft communication and ground-referenced navigation system. The system operates in the High-Frequency portion of the radio spectrum and utilizes ionospheric signal propagation. The effective operating range of the system extends to approximately 4000 miles.

25X1X3

Communication Transmissions

25X1X3

[redacted]

The Navigation Function 25X1X3

[redacted]

Transmitter Power Values

Both airborne and ground-based equipments utilize a special form of pulse modulation. The airborne transmitter radiates a peak pulse-power of 500 watts. The ground transmitter employed may be any one of several types of commercial transmitter equipment. Thus far, the system has utilized a Collins Type 231-D transmitter so modified as to permit transmission of peak pulse-power approximating 8.0 kw.

The airborne System 2 equipment obtains primary power from an aircraft 28-volt d-c source and from an aircraft 110-volt 400-cycle power source.

Structure of Equipment

The Appendix to this brochure contains photographs of both the airborne and the ground-based equipment. The airborne equipment consists of a total of 12 units and, in the special configuration required for its initial application, weighs 160 pounds exclusive of interconnection

cables. It is estimated that if this equipment were repackaged most advantageously for use under conditions not requiring the unique spatial distribution encountered in its original application, equipment weight could be reduced to approximately 115 pounds.

Because base-station transmitting and receiving sites are generally separated by several miles or more the present base-station equipment is divided into units for installation at a transmitting site and separate units for installation at a receiving site. The special base-station transmitting equipment is housed in two racks; the base-station receiving equipment is housed in three racks. Photographs of both types of equipment are included.

25X1X3

Types of Signal Modulation Employed

[redacted]

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Aircraft Cockpit Equipment

Control of the airborne communication equipment is afforded the pilot by means of a control box, a photograph of which appears in the Appendix. The left-hand dial on the control box determines the frequency employed for both transmitter and receiver operation and is identified as "channel selector". Each of the three dials to the right of the channel selector dial may be set in any one of ten positions. The settings of these dials determine selection of the message to be transmitted from air to ground. A "transmit" button appears at the left of the channel selector dial. Momentary depression of this button activates the transmitter and causes it to transmit automatically the recognition and verification signal group and the message which has been set into the three right-hand dials. A master power switch for the system appears on the top of the control box.

Information received by the airborne system from ground stations is displayed in printed form by means of a printer unit, a photograph of which is shown in the Appendix.

The ground-based equipment utilizes essentially similar means for channel selection and message input, and employs a printer unit for display of air-to-ground transmissions which is identical to that employed in the aircraft.

Antennas

In its present configuration, the airborne portion of System 2 equipment utilizes a short-wire antenna for both transmission and reception.

For maximum effectiveness of the equipment, it is desirable to employ comparatively high gain antennas at both the ground-based transmitting and receiving sites. The use of low-gain antennas at these locations would restrict the reliable range of operation unless corresponding increases were made in both airborne and ground-based transmitter power output.

Provision For Other Types Of Signalling

All components of System No. 2 except the transmitter high-voltage power transformer are of adequate rating to permit continuous operation of the equipment. Accordingly, replacement of this transformer by one designed to provide the required power continuously would permit utilization of the System No. 2 equipment for transmission and reception of teletype signals or other types of modulation imposing the requirement for a high duty cycle on the transmitting equipment.

APPENDIX

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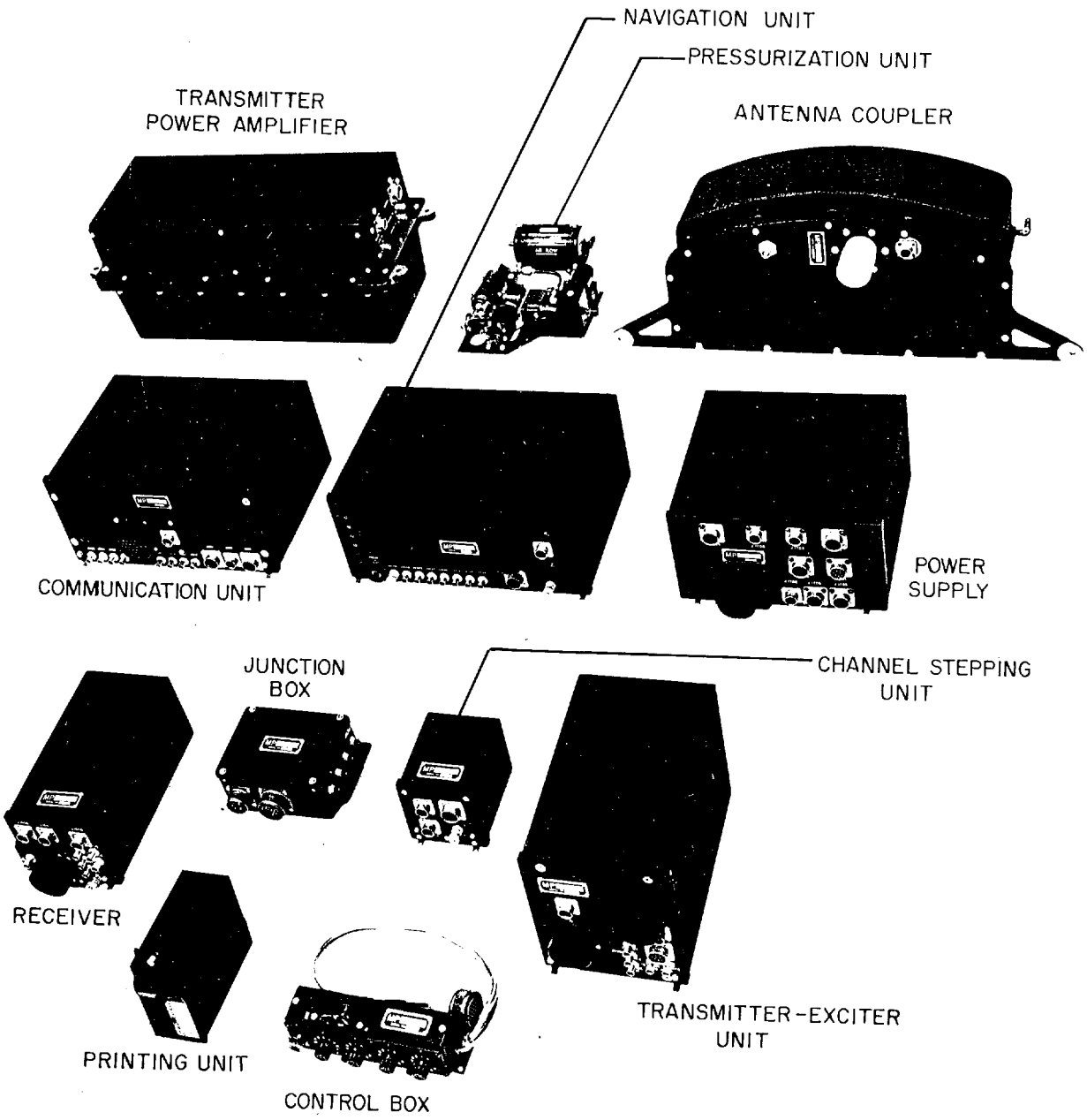

SYSTEM NO. 2
AIRBORNE EQUIPMENT

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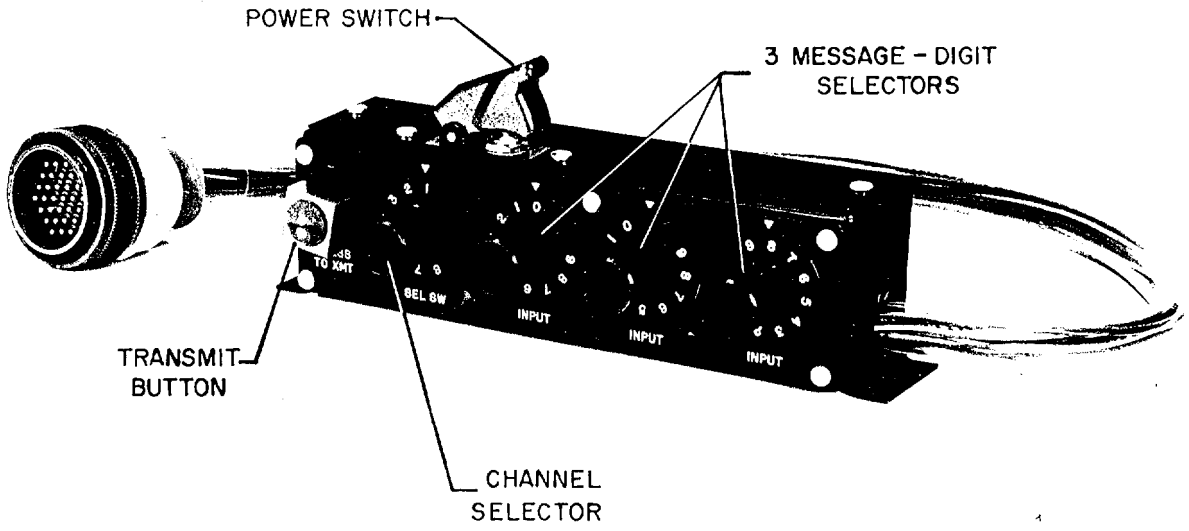

CONTROL BOX

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PRINTING UNIT

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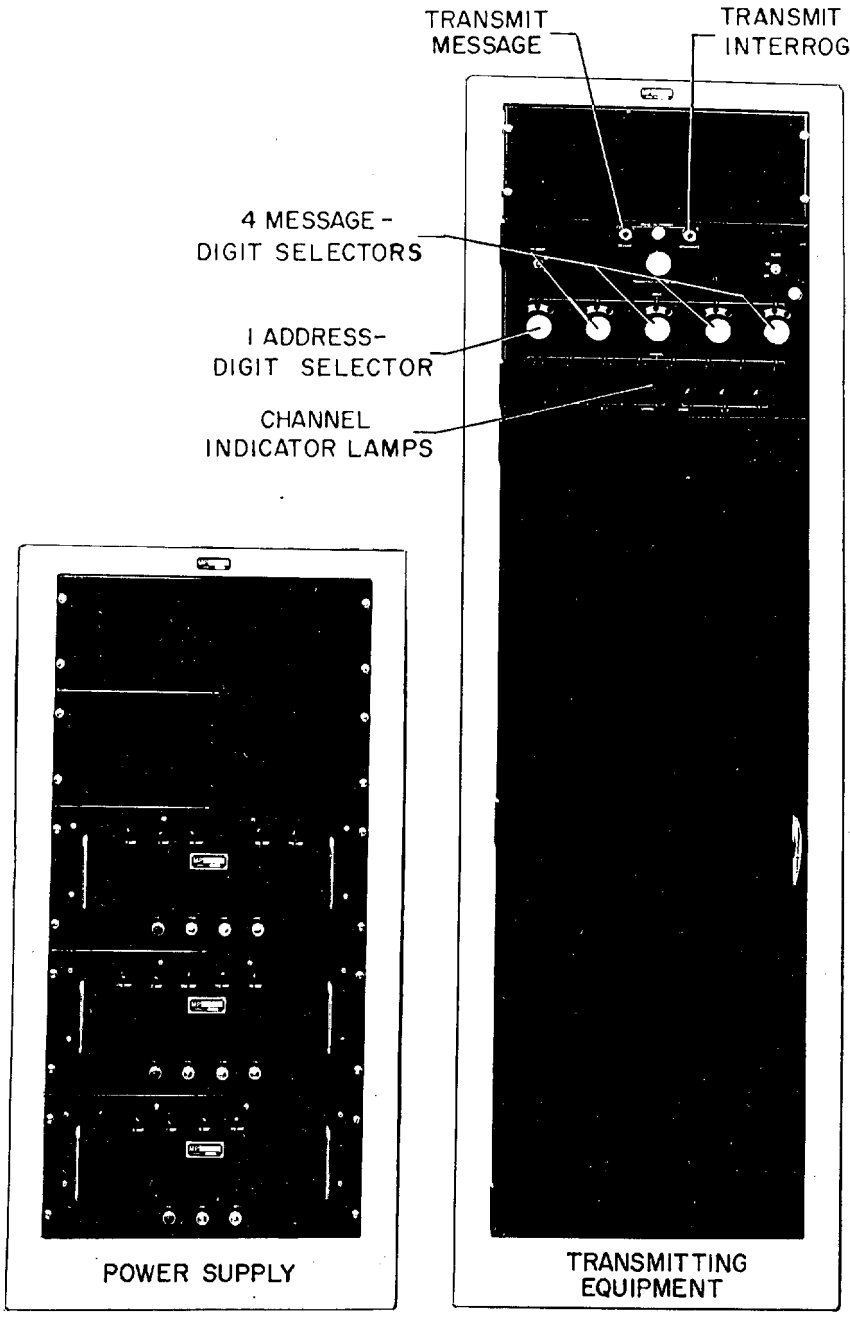

SYSTEM NO. 2
BASE-STATION TRANSMITTING EQUIPMENT

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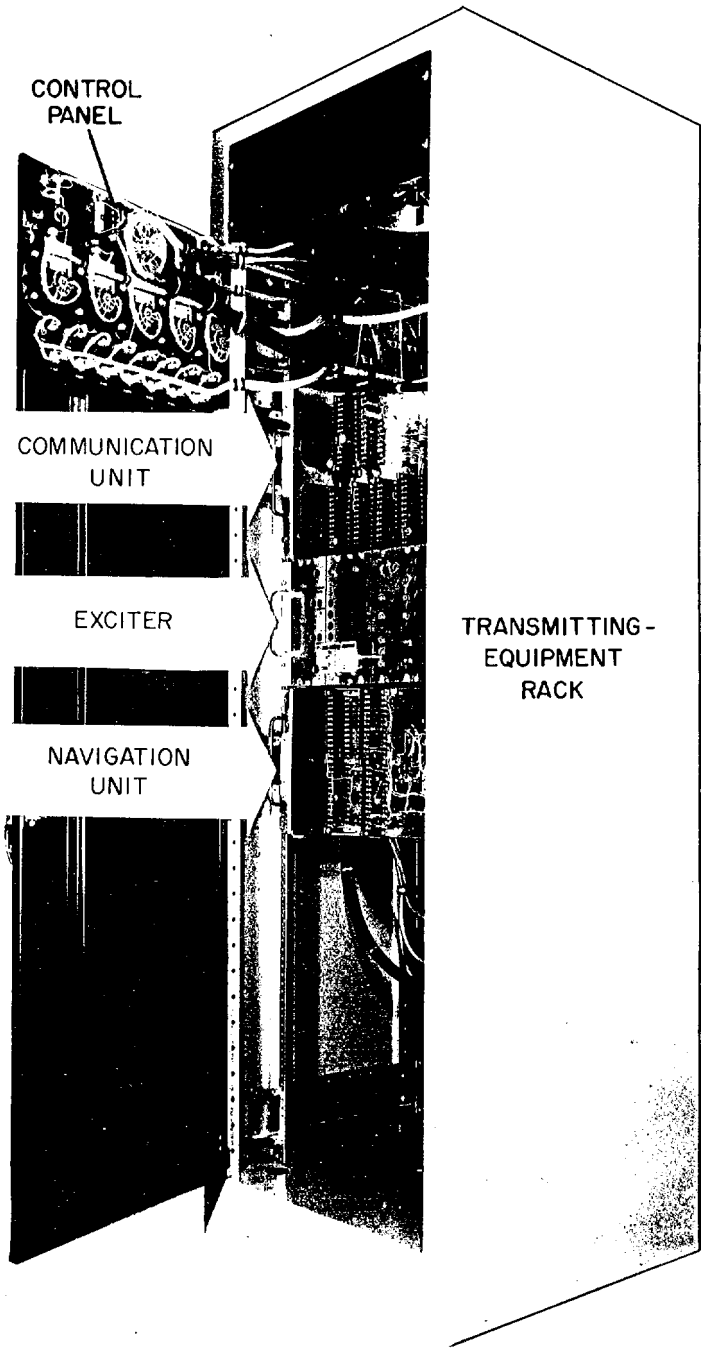

TRANSMITTING EQUIPMENT

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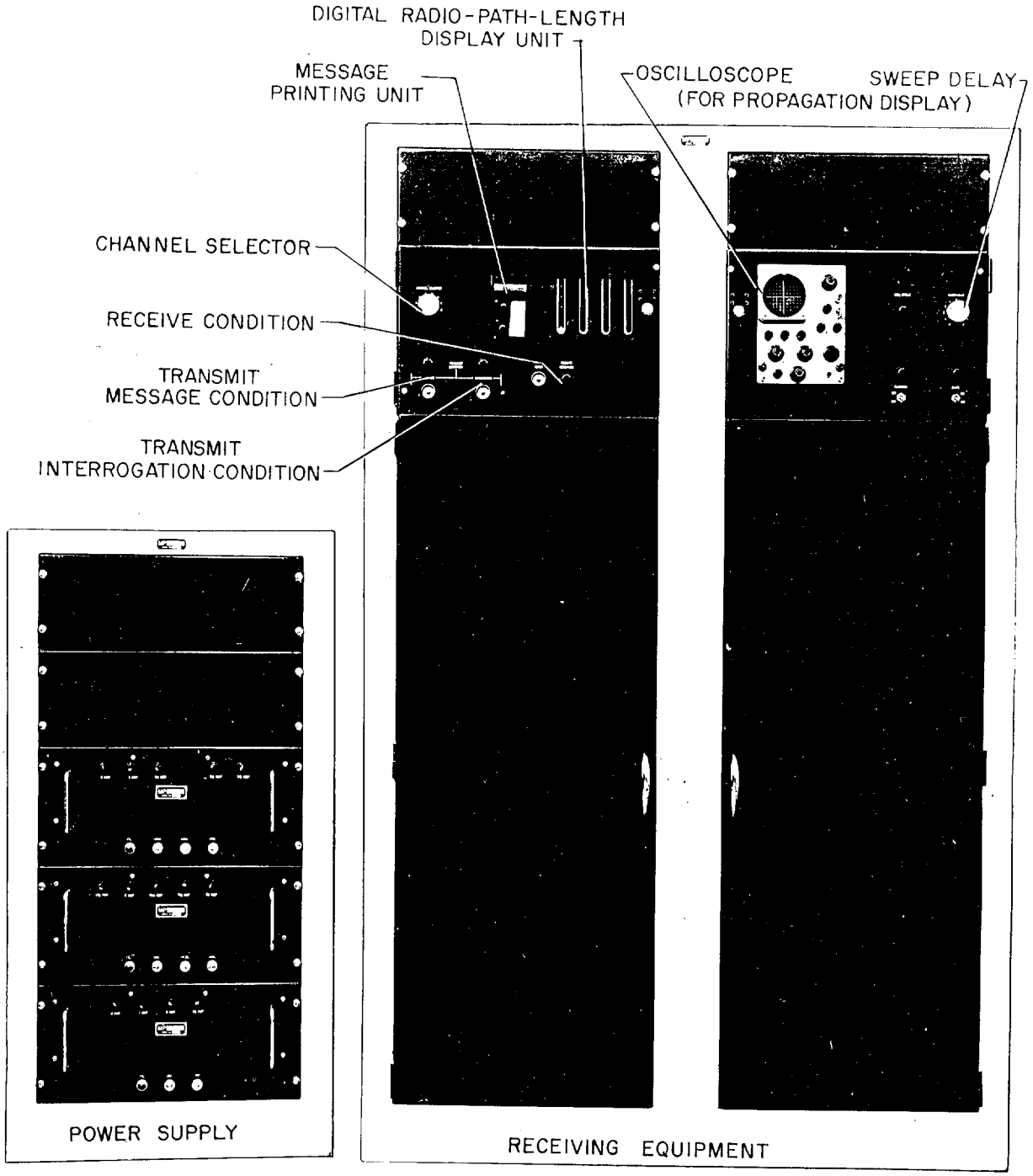

SYSTEM NO. 2
BASE-STATION RECEIVING EQUIPMENT

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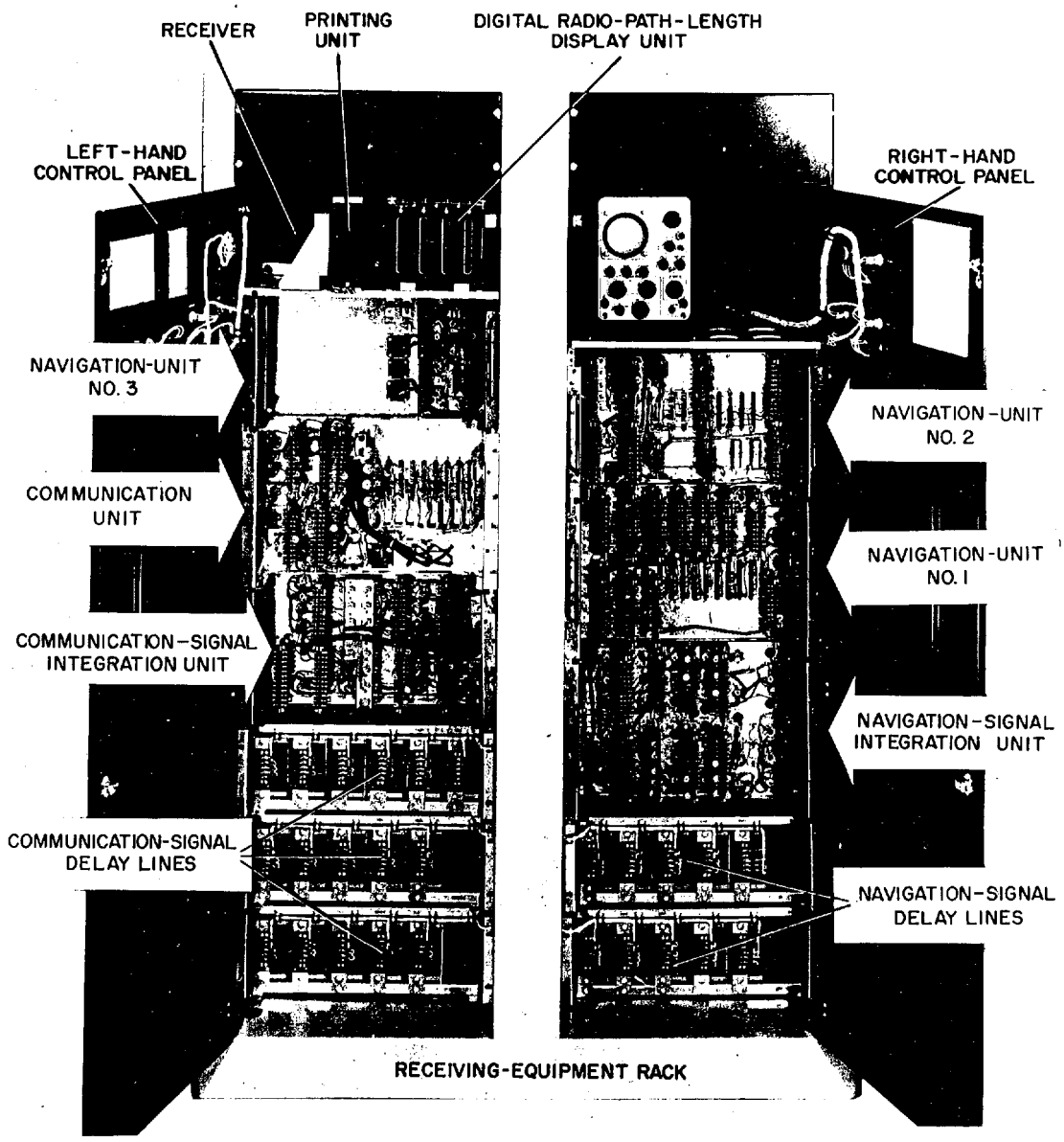

RECEIVING EQUIPMENT

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